

Fiscal Year 2003 Funding for Research on Vapor Space Corrosion

Savannah River:

The fiscal year 2003 activities related to vapor space corrosion are a continuation of fiscal year 2002 experimental studies. The fiscal year 2003 funding is approximately \$250K. The following tasks are included in this \$250K:

- Quantify rates of general corrosion and pitting of material samples evaluated in a test matrix.
- Electrochemical testing and instrumented bolt wedge open load testing will be done to provide a fundamental basis for understanding the vapor space corrosion and liquid/air interface corrosion processes/mechanisms.
- Review and correlation of historical operational, experimental, and inspection records to vapor space corrosion and liquid/air interface corrosion.

Office of River Protection:

In fiscal year 2003, ORP has approximately \$30K of work planned for Electro-Chemical Noise probe data collection and correlation. Data relates to corrosion in vapor space, supernate, and sludge layers.

Controls at Savannah River Site and Hanford Tanks Related to Vapor Space Corrosion

1. Savannah River Tanks:

TSR Section	Control	Safety Function
5.8.2.13 (current and 10CFR830)	Corrosion Control Program	Ensures tank chemistry and temperature are controlled to minimize corrosion of tank walls and transfer lines. Program includes tank annulus ventilation operation and limits on pH, OH ⁻ , NO ₂ ⁻ , NO ₃ ⁻ , SO ₄ ⁻² , and Cl ⁻ . Verification of chemistry shall be performed by periodically sampling tank contents.
5.8.2.16 (current) 5.8.2.12 (10CFR830)	Structural Integrity Program	Provides reasonable assurance that the evidence of structural or functional degradation during services is detected to permit corrective action before the function is compromised. The program shall determine those inspections/measurements that need to be performed to ensure it will perform its intended design function under operational and accident conditions.
5.8.2.24 (10CFR830)	Tank Fill Limits	Engineering shall determine (and document in ERD) the waste tank fill limit for each waste tank. This provides the most limiting value to protect tank overflow, tank integrity, and flammability assumptions.

2. Hanford Tanks:

CONTROL DESCRIPTION	FREQUENCY	ENFORCEMENT
a. Chemistry Control Program		
Maintain nitrite, nitrate, and hydroxide concentrations within limits.	Continuous	TSR, AC 5.15, <i>Chemistry Control Program</i> (to be re-titled as <i>Corrosion Mitigation Program</i> upon implementation of ORP letter 03-TED-006)

2. Hanford Tanks:

CONTROL DESCRIPTION	FREQUENCY	ENFORCEMENT
Conduct periodic sampling of the waste in DSTs and AWF tanks to determine the nitrite, nitrate, and hydroxide concentrations.	Frequency of sampling determined by predicted rate of hydroxide depletion with a minimum sampling frequency of <u>every five years</u> . Sample schedule is included in the Technical Basis for Chemistry Control Program, which is <u>updated annually</u> , and incorporated into the Characterization Sampling Priority Document (CSPD), which is published annually. Each CSPD identifies the tanks scheduled for sampling during the current fiscal year, and projections for the following year and out-years.	TSR, AC 5.15, <i>Chemistry Control Program</i> (to be re-titled as <i>Corrosion Mitigation Program</i> upon implementation of ORP letter 03-TED-006)
Establish and maintain database to track the nitrite, nitrate, and hydroxide concentrations in each DST and AWF tank.	Database of tank waste characterization data is maintained in Tank Waste Information Network System (TWINS). <u>Quarterly reviews</u> of characterization data are performed to ensure compliance with limits and for changes in depletion trends based on new sample data or tank transfers.	TSR, AC 5.15, <i>Chemistry Control Program</i> (to be re-titled as <i>Corrosion Mitigation Program</i> upon implementation of ORP letter 03-TED-006)
For waste transfers, evaluate the sending and receiving tanks for compliance with waste chemistry limits.	Evaluated prior to all waste transfers into the DST system as part of waste compatibility program.	TSR, AC 5.15, <i>Chemistry Control Program</i> (to be re-titled as <i>Corrosion Mitigation Program</i> upon implementation of ORP letter 03-TED-006) TSR, AC 5.12, <i>Transfer Controls</i>

2. Hanford Tanks:

CONTROL DESCRIPTION	FREQUENCY	ENFORCEMENT
When a DST or AWF tank is determined to be outside the established limits for the nitrite, nitrate, or hydroxide concentrations, submit a recovery plan to DOE and implement following DOE approval.	Recovery plan submitted within 30 days of DST or AWF identified to be outside the established limits.	TSR, AC 5.15, <i>Chemistry Control Program</i> (to be re-titled as <i>Corrosion Mitigation Program</i> upon implementation of ORP letter 03-TED-006)
b. Annulus Ventilation Controls		
Annulus ventilation systems shall be operating except for maintenance outages not to exceed 30 days.	N/A	ORP approved controls for addition to TSR, AC 5.15, <i>Chemistry Control Program</i> , (to be re-titled as <i>Corrosion Mitigation Program</i> upon implementation of ORP letter 03-TED-006)
When either (1) annulus ventilation system is out of service for longer than 30 days, or (2) the monitoring program indicates ingress of water into the annulus, submit a recovery plan to DOE and implement following DOE approval.	N/A	ORP approved controls for addition to TSR, AC 5.15, <i>Chemistry Control Program</i> , (to be re-titled as <i>Corrosion Mitigation Program</i> upon implementation of ORP letter 03-TED-006)
c. DST Inspection Programs (Not TSR-Level Controls but Included for Information)		
Ultrasonic testing (UT) and inspection program	All 28 DSTs are UT inspected on an 8 – 10 year periodicity. UT baseline complete by FY 2005	Hanford Federal Facilities Agreement Consent Order (Tri-Party Agreement M-48 series milestones)
Visual/Video testing (VT) and inspection Program	All 28 DSTs will be VT inspected in both the primary and annulus spaces, with a 5 – 7 year periodicity. VT baseline complete by FY 2003	Hanford Federal Facilities Agreement Consent Order (Tri-Party Agreement M-48 series milestones)
Corrosion Probe Monitoring	3 DSTs are being continuously monitored (vapor space, supernatant and sludge regions) with electro-chemical noise probes (EN).	Continuation of pilot program started under TFA, to develop real-time DST corrosion measurement.

**Tanks Focus Area Fiscal Year 2002 Funded Activities
in the Safety Functional Area**

The Tanks Focus Area (TFA) was established in 1994 and was responsible for science and technology development to support DOE's five major tank sites: Hanford, Idaho, Oak Ridge, Savannah River Site, and West Valley. Its technical scope covered the major functional areas that comprise a complete tank remediation system: safety, characterization, retrieval, pretreatment, immobilization, and closure. The TFA integrated tank-related activities across all organizations that funded tank science and technology within DOE's Office of Environmental Management, comprising the Offices of Integration and Disposition (EM-20), Site Closure (EM-30), Project Completion (EM-40), and Science and Technology (EM-50). In addition to its research and development activities, TFA also supported the Fernald site by providing technical assistance on its silos retrieval project.

An EM-50 reorganization during fiscal year 2002 required that all funded TFA activities be either closed out or transferred to the sites by September 20, 2002. The table below lists TFA activities funded in fiscal year 2002 that were associated with the safety functional area. The activities are listed by their multi-year technical response (MYTR) number.

MYTR	Safety Functional Area Activity
B143	HLW Tank Corrosion Control and Monitoring
B157	Tank Leak Mitigation
B171	Alternative Air Filtration Technology
B175	Tank Integrity Inspection Techniques
B1S1	Pre-Closure Interim Tank Maintenance

The EM-50 program is now streamlined and refocused on a limited number of critical, high-payback activities where step improvements can be gained (versus a large number of activities that offer only incremental improvements), as well as on activities supporting closure sites. The goal is to enable cleanup to be accomplished safely, at less cost, and on an accelerated schedule.

In fiscal year 2003, EM-50 and site offices continue to support research and development addressing safety functional area activities. In the area of HLW Tank Corrosion Control and Monitoring (B143), Savannah River Site is working to install a corrosion probe in a HLW tank later this year. The Office of River Protection is funding electro-chemical noise probe data collection and correlation. In the area of Tank Integrity Inspection Techniques (B175), the AMS-1TM wall crawler is currently being used to inspect Tank 32 at Savannah River Site.